

## CLAIMS

What is claimed is:

1. A method of predicting head-disk interaction in a magnetic data storage and retrieval system, comprising:

detecting a position error signal amplitude indicative of the distance between an expected position of a magnetic head relative to a track centerline and an actual position of the magnetic head relative to the track centerline;

filtering the position error signal amplitude to generate a sway mode signal amplitude indicative of an oscillation of the actual position of the magnetic head relative to the track centerline in a selected frequency range;

determining an absolute value of the sway mode signal amplitude;

determining whether the absolute value of the sway mode signal amplitude exceeds a threshold value; and

responsive to determining that the absolute value of the sway mode signal amplitude exceeds the threshold value, propagating a warning signal.

2. The method of claim 1, wherein the filtering step further comprises:

testing a magnetic data storage and retrieval system to determine a unique sway mode frequency range; and

programming a programmable filter to exclude signals other than those near the unique sway mode frequency.

3. The method of claim 1, wherein the detecting step further comprises detecting a position error signal during an idle time function.

4. (Canceled)

5. (Canceled)

6. (Canceled)

7. (Canceled)

8. An apparatus for predicting head-disk crash in a magnetic data storage and retrieval system, comprising:

means for detecting a position error signal amplitude indicative of the distance between an expected position of a magnetic head relative to a track centerline and an actual position of the magnetic head relative to the track centerline;

means for filtering the position error signal amplitude to generate a sway mode signal amplitude indicative of an oscillation of the actual position of the magnetic head relative to the recording surface in a selected frequency range;

means for determining an absolute value of the sway mode signal amplitude;

means for determining whether the absolute value of the sway mode signal amplitude exceeds a threshold value; and

means for, responsive to determining that the absolute value of the sway mode signal amplitude exceeds the threshold value, propagating a warning signal.

9. The apparatus of claim 8, wherein the means for filtering further comprises:

means for testing a magnetic data storage and retrieval system to determine a unique sway mode frequency range; and

means for programming a programmable filter to exclude signals other than those near the unique sway mode frequency range.

10. The apparatus of claim 8, wherein the means for detecting further comprises means for detecting a position error signal during an idle time function.

11. (Canceled)

12. (Canceled)

13. (Canceled)

14. (Canceled)

15. The apparatus of claim 8, wherein the apparatus for predicting head-disk crash in a magnetic data storage and retrieval system further comprises:

an outer housing or base containing a plurality of stacked, parallel magnetic disks, which are closely spaced apart;

an actuator comprising a plurality of stacked, parallel actuator arm/suspensions in the form of a comb that is pivotally mounted to the base about a pivot assembly;

a controller, mounted to the base, for selectively moving the comb of arm/suspensions relative to disks and monitoring and providing command inputs to the actuator; and

one or more magnetic read/write transducers.

16. (Canceled)

17. (Canceled)

18. A computer program product in a computer usable medium for predicting head-disk crash in a magnetic data storage and retrieval system, comprising:

instructions on the computer usable medium for detecting a position error signal amplitude indicative of the distance between an expected position of a magnetic head relative to a track centerline and an actual position of the magnetic head relative to the track centerline;

instructions on the computer usable medium for filtering the position error signal to generate a sway mode signal amplitude indicative of an oscillation of the actual position of the magnetic head relative to the track centerline in a selected frequency range;

instructions on the computer usable medium for determining an absolute value of the sway mode signal amplitude;

instructions on the computer usable medium for determining whether the absolute value of the sway mode signal amplitude exceeds a threshold value; and

instructions on the computer usable medium for, responsive to determining that the absolute value of the sway mode signal amplitude exceeds the threshold value, propagating a warning signal.

19. The computer program product of claim 18, wherein the instructions for filtering further comprise:

instructions on the computer usable medium for testing a magnetic data storage and retrieval system to determine a unique sway mode frequency range; and

instructions on the computer usable medium for programming a programmable filter to exclude signals other than those near the unique sway mode frequency range.

20. The computer program product of claim 18, wherein the instructions for detecting further comprise instructions on the computer usable medium for detecting a position error signal amplitude during an idle time function.